

WHAT IS CLAIMED IS:

[c01] 1. A power system comprising:

a fuel preconditioner adapted to convert a fuel to at least one conditioned fuel;

a pulse detonation combustor adapted to receive the conditioned fuel and a primary oxidizer and to detonate a mixture comprising the conditioned fuel and the primary oxidizer and exhaust a plurality of detonation products; and

a turbine positioned downstream from said pulse detonation combustor, said turbine being in flow communication with said pulse detonation combustor.

[c02] 2. The power system of Claim 1, wherein said fuel preconditioner comprises a heat source configured to heat the fuel so as to pyrolyze the fuel.

[c03] 3. The power system of Claim 2, wherein said fuel preconditioner further comprises a catalyst adapted to enhance the pyrolysis of the fuel.

[c04] 4. The power system of Claim 1, wherein said fuel preconditioner comprises a plasma source configured to pyrolyze the fuel.

[c05] 5. The power system of Claim 1, wherein said fuel preconditioner comprises a catalyst adapted to pyrolyze the fuel.

[c06] 6. The power system of Claim 1, wherein the fuel comprises a hydrocarbon fuel.

[c07] 7. The power system of Claim 1, wherein the fuel is selected from the group consisting of natural gas and distillate liquids fuels.

[c08] 8. The power system of Claim 1, wherein said pulse detonation combustor is further adapted to receive a primary fuel and to detonate a mixture

comprising the conditioned fuel, the primary fuel and the primary oxidizer and exhaust a plurality of detonation products.

[c09] 9. The power system of Claim 8, wherein the primary fuel comprises a hydrocarbon fuel.

[c10] 10. The power system of Claim 8, wherein the primary fuel is selected from the group consisting of natural gas and distillate liquids fuels.

[c11] 11. The power system of Claim 1, further comprising a compressor configured to supply air to at least one of said fuel preconditioner, said pulse detonation combustor, and said turbine.

[c12] 12. The power system of Claim 1, further comprising a steam turbine assembly adapted to receive an exhaust stream from said turbine, to generate steam using the exhaust stream, and to generate power using the steam.

[c13] 13. The power system of Claim 12, wherein said steam turbine assembly comprises:

a steam turbine adapted to generate power using the steam;

a condenser adapted to receive and condense an exhaust steam from said steam turbine to supply a fluid stream; and

a pump adapted to receive and pump the fluid stream.

[c14] 14. The power system of Claim 13, wherein said steam turbine assembly further comprises a heat recovery steam generator adapted to receive the exhaust stream from said turbine, to receive the fluid flow from said pump, and to generate steam from the fluid flow using the exhaust stream.

[c15] 15. A power plant comprising:

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at least one fuel preconditioner adapted to convert a fuel to at least one conditioned fuel; and

a plurality of power systems, each of said power systems comprising:

a pulse detonation combustor adapted to receive the conditioned fuel and a primary oxidizer and to detonate a mixture comprising the conditioned fuel and the primary oxidizer and exhaust a plurality of detonation products; and

a turbine positioned downstream from said pulse detonation combustor, said turbine being in flow communication with said pulse detonation combustor.

[c16] 16. The power plant of Claim 15, further comprising at least one compressor configured to supply air to at least one of said fuel preconditioner, said pulse detonation combustors, and said turbines.

[c17] 17. The power plant of Claim 15, wherein each of said power systems further comprises a compressor configured to supply air to at least one of said pulse detonation combustor and said turbine.

[c18] 18. The power plant of Claim 15, further comprising at least one steam turbine assembly adapted to receive an exhaust stream from at least one of said turbines, to generate steam using the exhaust stream, and to generate power using the steam.

[c19] 19. The power plant of Claim 18, wherein said steam turbine assembly comprises:

a steam turbine adapted to generate power using the steam;
a condenser adapted to receive and condense an exhaust steam from said steam turbine to supply a fluid stream;
a pump adapted to receive and pump the fluid stream; and
a heat recovery steam generator adapted to receive the exhaust stream from said turbine, to receive the fluid flow from said pump, and to generate steam from the fluid flow using the exhaust stream.

[c20] 20. The power plant of Claim 19, wherein said heat recovery steam generator is further adapted to supply a portion of the steam generated to said fuel preconditioner.

[c21] 21. The power plant of Claim 15, further comprising at least one heat recovery unit adapted to receive the exhaust stream from at least one of said turbines, to heat an intermediate fluid using the exhaust stream, and to supply a heated intermediate fluid flow to the fuel preconditioner.

[c22] 22. A power system comprising:
a fuel preconditioner comprising a reformer adapted to receive and reform a fuel and to generate a reformat; and
a pulse detonation combustor adapted to receive the reformat and an oxidizer and to detonate a mixture comprising the reformat and the oxidizer and exhaust a plurality of detonation products.

[c23] 23. The power system of Claim 22, further comprising:

a water source adapted to supply said reformer with water, said reformer being adapted to reform the fuel using the water; and

a fuel source adapted to supply said reformer with the fuel.

[c24] 24. The power system of Claim 23, further comprising a reformate holding unit adapted to receive the reformate from said reformer and to supply the reformate to said pulse detonation combustor.

[c25] 25. The power system of Claim 23, further comprising a pump (422) adapted to pump the water from said water source to said reformer.

[c26] 26. The power system of Claim 23, wherein said pulse detonation combustor is adapted to heat at least one of the fuel from said fuel source and the water from said water source so that at least one of the fuel and the water received by said reformer are heated.

[c27] 27. The power system of Claim 26, wherein said pulse detonation combustor is adapted to directly heat at least one of the fuel from said fuel source and the water from said water source.

[c28] 28. The power system of Claim 26, wherein said pulse detonation combustor is adapted to indirectly heat at least one of the fuel from said fuel source and the water from said water source.

[c29] 29. The power system of Claim 23, further comprising a turbine positioned downstream from said pulse detonation combustor, said turbine being in flow communication with said pulse detonation combustor.

[c30] 30. The power system of Claim 29, further comprising a heat exchanger adapted to receive an exhaust stream from said turbine and to heat at least one of the fuel from said fuel source and the water from said water source.

[c31] 31. The power system of Claim 30, wherein said heat exchanger (450) is adapted to heat both the fuel and the water.

[c32] 32. The power system of Claim 22, wherein said pulse detonation chamber is further adapted to receive a primary fuel and to detonate a mixture comprising the primary fuel, the reformat, and the oxidizer and exhaust the detonation products.

[c33] 33. The power system of Claim 32, wherein the primary fuel comprises a hydrocarbon fuel.

[c34] 34. The power system of Claim 32, wherein the primary fuel comprises natural gas.

[c35] 35. The power system of Claim 22, wherein the fuel comprises a hydrocarbon fuel.

[c36] 36. The power system of Claim 22, wherein the fuel comprises natural gas.

[c37] 37. The power system of Claim 22, wherein said reformer comprises a catalytic reformer.

[c38] 38. A power system comprising:

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an Oxygen enrichment unit adapted to receive air and to supply an Oxygen enriched stream;

a pulse detonation combustor adapted to receive a fuel and the Oxygen enriched stream and to detonate a mixture comprising the fuel and the Oxygen enriched stream and exhaust a plurality of detonation products; and

a turbine positioned downstream from said pulse detonation combustor, said turbine being in flow communication with said pulse detonation combustor.

[c39] 39. The power system of Claim 38, wherein said Oxygen enrichment unit is further adapted to supply a Nitrogen enriched stream, and wherein said turbine is adapted to receive the Nitrogen enriched stream.

[c40] 40. The power system of Claim 38 further comprising a fuel preconditioner adapted to convert a base fuel to at least one conditioned fuel, and wherein the fuel received and detonated by said pulse detonation combustor comprises the conditioned fuel.

[c41] 41. The power system of Claim 40, wherein said pulse detonation combustor is further adapted to receive a primary fuel, and wherein the fuel received and detonated by said pulse detonation combustor comprises the conditioned fuel and the primary fuel.

[c42] 42. The power system of Claim 40, further comprising a compressor configured to supply compressed air to at least one of said fuel preconditioner, said pulse detonation combustor, and said turbine.

[c43] 43. The power system of Claim 42, wherein said compressor is adapted to supply compressed air to said pulse detonation combustor, and wherein said pulse detonation combustor is adapted to detonate a mixture comprising the conditioned fuel, the Oxygen enriched stream, and the compressed air and exhaust a plurality of detonation products.

[c44] 44. The power system of Claim 40, wherein said fuel preconditioner comprises a reformer adapted to receive and reform a base fuel and to generate a reformat, and wherein the fuel received and detonated by said pulse detonation combustor comprises the reformat.

[c45] 45. The power system of Claim 38, wherein said Oxygen enrichment unit is further adapted to supply a Nitrogen enriched stream, and wherein at least a portion of the Nitrogen enriched stream is used to cool said pulse detonation combustor.